

10583-WO.ST25
SEQUENCE LISTING

<110> Novozymes A/S
<120> Amylase
<130> 10583-WO
<160> 19
<170> PatentIn version 3.2
<210> 1
<211> 1946
<212> DNA
<213> *Valsaria rubricosa*

<220>
<221> CDS
<222> (86)..(1843)

<220>
<221> sig_peptide
<222> (86)..(145)

<220>
<221> mat_peptide
<222> (146)..(1843)

<400> 1
tcccgggtcat cctctcttgg tccctgccat cctcctgccc cctctgatcc accgcctctt 60
cggtggactc caagacgttg tcagg atg cga tcc ttc ctc gcc ctc tca gcc 112
Met Arg Ser Phe Leu Ala Leu Ser Ala
-20 -15
ttg ctg ctg ctg tac ccg ctg cag ctg ctc gcc gcc agc aac tcc gac 160
Leu Leu Leu Leu Tyr Pro Leu Gln Leu Leu Ala Ala Ser Asn Ser Asp
-10 -5 -1 1 5
tgg agg tcc cgc aat atc tac ttt gcc ttg acc gac cgc gtc gcc aat 208
Trp Arg Ser Arg Asn Ile Tyr Phe Ala Leu Thr Asp Arg Val Ala Asn
10 15 20
ccg tcc acc acg acc gca tgt agt gac ctg agc aac tac tgc ggc ggc 256
Pro Ser Thr Thr Thr Ala Cys Ser Asp Leu Ser Asn Tyr Cys Gly Gly
25 30 35
acg tgg agc ggc ctg tcg agc aag ctg gac tac atc caa ggg atg ggc 304
Thr Trp Ser Gly Leu Ser Ser Lys Leu Asp Tyr Ile Gln Gly Met Gly
40 45 50
ttc gat tcc atc tgg att acc ccc gtg gtc gag aac tgc gac ggt ggc 352
Phe Asp Ser Ile Trp Ile Thr Pro Val Val Glu Asn Cys Asp Gly Gly
55 60 65
tac cac ggc tac tgg gcc aag gcg ctc tac aac gtc aac acg aac tac 400
Tyr His Gly Tyr Trp Ala Lys Ala Leu Tyr Asn Val Asn Thr Asn Tyr
70 75 80 85
ggc agt gcg gat gat ctg aag aac ttc gtt gcg gcc gcc cat gcg aag 448
Gly Ser Ala Asp Asp Leu Lys Asn Phe Val Ala Ala Ala His Ala Lys
90 95 100
ggc atg tac gtg atg gtg gac gtc gtc gcg aat cac atg ggt tcc tgc 496
Gly Met Tyr Val Met Val Asp Val Val Ala Asn His Met Gly Ser Cys
105 110 115

10583-WO.ST25

ggc Gly	atc Ile	gcc Ala 120	aac Asn	ctc Leu	tcc Ser	cca Pro	cct Pro 125	ccc Pro	ctg Leu	aac Asn	gag Glu 130	cag Gln	agc Ser	tct Ser	tat Tyr	544
cac His	acc Thr 135	cag Gln	tgc Cys	gac Asp	att Ile	gac Asp 140	tac Tyr	agc Ser	agt Ser	cag Gln	tcc Ser 145	agc Ser	att Ile	gag Glu	acg Thr	592
tgc Cys 150	tgg Trp	ata Ile	tcc Ser	ggc Gly	ctc Leu 155	cct Pro	gac Asp	ctg Leu	gac Asp	acc Thr 160	acc Thr	gat Asp	agc Ser	act Thr	atc Ile 165	640
cga Arg	tcc Ser	ctc Leu	ttc Phe	cag Gln 170	acc Thr	tgg Trp	gtc Val	cac His	ggc Gly 175	ctg Leu	gtc Val	agc Ser	aac Asn	tac Tyr 180	agc Ser	688
ttc Phe	gac Asp	ggt Gly	ctc Leu 185	cgc Arg	gtc Val	gac Asp	acc Thr	gtc Val 190	aag Lys	cac His	gtg Val	gag Glu	aag Lys 195	gat Asp	tac Tyr	736
tgg Trp	ccc Pro	ggc Gly 200	ttc Phe	gtg Val	tcg Ser	gcg Ala	gcg Ala 205	ggc Gly	acc Thr	tac Tyr	gcc Ala 210	atc Ile	ggc Gly	gaa Glu	gtc Val	784
ttc Phe	tcc Ser 215	ggc Gly	gac Asp	acc Thr	tcc Ser	tac Tyr 220	gtg Val	gcc Ala	ggc Gly	tat Tyr	caa Gln 225	tcg Ser	gtg Val	atg Met	ccg Pro	832
ggc Gly 230	ttg Leu	ctc Leu	aac Asn	tat Tyr	ccc Pro 235	atc Ile	tac Tyr	tat Tyr	ccg Pro	ctc Leu 240	atc Ile	cgc Arg	gtc Val	ttc Phe	gcg Ala 245	880
cag Gln	ggt Gly	gcg Ala	tcc Ser	ttc Phe 250	acc Thr	gat Asp	ctc Leu	gtc Val	aac Asn 255	aac Asn	cac His	gat Asp	acc Thr	gtc Val 260	ggc Gly	928
tcg Ser	acc Thr	ttc Phe 265	tcc Ser	gac Asp	ccg Pro	acg Thr	ctg Leu	ctg Leu 270	ggt Gly	aac Asn	ttt Phe	atc Ile	gac Asp 275	aac Asn	cac His	976
gac Asp	aac Asn	cca Pro 280	cgt Arg	ttc Phe	ctg Leu	agc Ser	tac Tyr 285	acc Thr	agc Ser	gac Asp	cac His	gcc Ala 290	ctc Leu	ctc Leu	aag Lys	1024
aac Asn 295	gct Ala	ctg Leu	gcc Ala	tac Tyr	gtc Val	atc Ile 300	ctg Leu	gcc Ala	aga Arg	ggc Gly	atc Ile 305	ccc Pro	atc Ile	gtc Val	tac Tyr	1072
tac Tyr 310	ggc Gly	acc Thr	gag Glu	caa Gln	ggc Gly 315	tac Tyr	tcg Ser	ggt Gly	tcg Ser	tcc Ser 320	gac Asp	ccg Pro	gcg Ala	aac Asn	cgc Arg 325	1120
gag Glu	gat Asp	ctc Leu	tgg Trp	cgt Arg 330	agc Ser	gga Gly	tac Tyr	agc Ser	act Thr 335	acg Thr	gga Gly	gac Asp	atc Ile	tac Tyr 340	acc Thr	1168
acc Thr	atc Ile	gcc Ala 345	gcg Ala	ctc Leu	tcc Ser	gcc Ala	gcg Ala	cgc Arg 350	acc Thr	gcg Ala	gcc Ala	ggt Gly	ggc Gly 355	ctc Leu	gcc Ala	1216
ggt Gly	aac Asn	gac Asp 360	cac His	gtc Val	cac His	ctg Leu	tac Tyr 365	acg Thr	acc Thr	gac Asp	aac Asn	gcg Ala 370	tac Tyr	gcc Ala	tgg Trp	1264
tcc Ser	cgg Arg 375	gcg Ala	agc Ser	ggc Gly	aag Lys	ctc Leu 380	atc Ile	gtc Val	gtc Val	acg Thr	tcc Ser 385	aac Asn	cgc Arg	ggc Gly	agc Ser	1312

10583-WO.ST25

tcc gac agc agc acc atc tgc ttc agc acc cag cag gcc agc ggc acc 1360
 Ser Asp Ser Ser Thr Ile Cys Phe Ser Thr Gln Gln Ala Ser Gly Thr 405
 390 395 400

acc tgg acc agc acg atc acc ggc aac tcg tac acc gcc gac agc aac 1408
 Thr Trp Thr Ser Thr Ile Thr Gly Asn Ser Tyr Thr Ala Asp Ser Asn 420
 410 415

ggc cag atc tgc gtg cag ctg tcc agc ggc gga ccc gag gcg ctc gtc 1456
 Gly Gln Ile Cys Val Gln Leu Ser Ser Gly Gly Pro Glu Ala Leu Val 435
 425 430

gtc tcc acc gcg acc ggc acc gcc acc gcg acg act ctg tcc acg acc 1504
 Val Ser Thr Ala Thr Gly Thr Ala Thr Ala Thr Leu Ser Thr Thr 450
 440 445

acc aag acg tcc acc tcg acc gcc tcc tgc gcc gcc acc gtc gcc gtc 1552
 Thr Lys Thr Ser Thr Ser Thr Ala Ser Cys Ala Ala Thr Val Ala Val 465
 455 460

acc ttc aac gag ctc gtc acc acg aac tac ggc gac acc atc cgc ctg 1600
 Thr Phe Asn Glu Leu Val Thr Thr Asn Tyr Gly Asp Thr Ile Arg Leu 485
 470 475 480

acg ggc tcc atc tcc cag ctc agc agc tgg agc gca acc tcc ggg ctg 1648
 Thr Gly Ser Ile Ser Gln Leu Ser Ser Trp Ser Ala Thr Ser Gly Leu 500
 490 495

gcc ctg agc gcg tcc gcg tac acg tcc agc aac ccg ctc tgg agc gtg 1696
 Ala Leu Ser Ala Ser Ala Tyr Thr Ser Ser Asn Pro Leu Trp Ser Val 515
 505 510

acg gtc agc ctg ccg gcc ggc acg tcg ttc gag tac aag ttc gtc cgc 1744
 Thr Val Ser Leu Pro Ala Gly Thr Ser Phe Glu Tyr Lys Phe Val Arg 530
 520 525

atc acg agc gac ggc acc gtg acc tgg gaa tcg gac ccg aac cgc agc 1792
 Ile Thr Ser Asp Gly Thr Val Thr Trp Glu Ser Asp Pro Asn Arg Ser 545
 535 540

tac acc gtc ccg acg tgc gcg agc acc gcg acg atc agc aat acc tgg 1840
 Tyr Thr Val Pro Thr Cys Ala Ser Thr Ala Thr Ile Ser Asn Thr Trp 565
 550 555 560

cgg tgagctctgg acgtgttgta catataggag gccgttgaga ggccggggcg 1893
 Arg

gttggtggtc ggggtgaatg gggggttgat gctttttcgt tgtgtcggtg aga 1946

<210> 2
 <211> 586
 <212> PRT
 <213> Valsaria rubricosa

<400> 2

Met Arg Ser Phe Leu Ala Leu Ser Ala Leu Leu Leu Tyr Pro Leu
-20 -15 -10 -5

Gln Leu Leu Ala Ala Ser Asn Ser Asp Trp Arg Ser Arg Asn Ile Tyr
-1 1 5 10

Phe Ala Leu Thr Asp Arg Val Ala Asn Pro Ser Thr Thr Thr Ala Cys

10583-WO.ST25

15

20

25

Ser Asp Leu Ser Asn Tyr Cys Gly Gly Thr Trp Ser Gly Leu Ser Ser
 30 35 40
 Lys Leu Asp Tyr Ile Gln Gly Met Gly Phe Asp Ser Ile Trp Ile Thr
 45 50 55 60
 Pro Val Val Glu Asn Cys Asp Gly Gly Tyr His Gly Tyr Trp Ala Lys
 65 70 75
 Ala Leu Tyr Asn Val Asn Thr Asn Tyr Gly Ser Ala Asp Asp Leu Lys
 80 85 90
 Asn Phe Val Ala Ala Ala His Ala Lys Gly Met Tyr Val Met Val Asp
 95 100 105
 Val Val Ala Asn His Met Gly Ser Cys Gly Ile Ala Asn Leu Ser Pro
 110 115 120
 Pro Pro Leu Asn Glu Gln Ser Ser Tyr His Thr Gln Cys Asp Ile Asp
 125 130 135 140
 Tyr Ser Ser Gln Ser Ser Ile Glu Thr Cys Trp Ile Ser Gly Leu Pro
 145 150 155
 Asp Leu Asp Thr Thr Asp Ser Thr Ile Arg Ser Leu Phe Gln Thr Trp
 160 165 170
 Val His Gly Leu Val Ser Asn Tyr Ser Phe Asp Gly Leu Arg Val Asp
 175 180 185
 Thr Val Lys His Val Glu Lys Asp Tyr Trp Pro Gly Phe Val Ser Ala
 190 195 200
 Ala Gly Thr Tyr Ala Ile Gly Glu Val Phe Ser Gly Asp Thr Ser Tyr
 205 210 215 220
 Val Ala Gly Tyr Gln Ser Val Met Pro Gly Leu Leu Asn Tyr Pro Ile
 225 230 235
 Tyr Tyr Pro Leu Ile Arg Val Phe Ala Gln Gly Ala Ser Phe Thr Asp
 240 245 250
 Leu Val Asn Asn His Asp Thr Val Gly Ser Thr Phe Ser Asp Pro Thr
 255 260 265
 Leu Leu Gly Asn Phe Ile Asp Asn His Asp Asn Pro Arg Phe Leu Ser
 270 275 280
 Tyr Thr Ser Asp His Ala Leu Leu Lys Asn Ala Leu Ala Tyr Val Ile

Page 5

560

10583-WO.ST25
565

<210> 3
 <211> 18
 <212> DNA
 <213> Artificial

<220>
 <223> Primer amyD1

<220>
 <221> misc_feature
 <222> (3)..(3)
 <223> n is a, c, g, or t

<220>
 <221> misc_feature
 <222> (12)..(12)
 <223> n is a, c, g, or t

<400> 3
 gsntaccayg gntactgg

18

<210> 4
 <211> 17
 <212> DNA
 <213> Artificial

<220>
 <223> Primer amyD2R

<220>
 <221> misc_feature
 <222> (15)..(15)
 <223> n is a, c, g, or t

<400> 4
 tarayratkg gratncc

17

<210> 5
 <211> 17
 <212> DNA
 <213> Artificial

<220>
 <223> Primer AM835n-s1

<220>
 <221> misc_feature
 <222> (15)..(15)
 <223> n is a, c, g, or t

<400> 5
 aayaartayt tygcnyt

17

<210> 6
 <211> 17
 <212> DNA
 <213> Artificial

<220>

10583-WO.ST25

<223> Primer AM835n-s2a

<220>

<221> misc_feature

<222> (3)..(3)

<223> n is a, c, g, or t

<220>

<221> misc_feature

<222> (6)..(6)

<223> n is a, c, g, or t

<220>

<221> misc_feature

<222> (15)..(15)

<223> n is a, c, g, or t

<400> 6

ctngngngaya grgtngc

17

<210> 7

<211> 17

<212> DNA

<213> Artificial

<220>

<223> Primer AM835n-s2b

<220>

<221> misc_feature

<222> (3)..(3)

<223> n is a, c, g, or t

<220>

<221> misc_feature

<222> (6)..(6)

<223> n is a, c, g, or t

<220>

<221> misc_feature

<222> (15)..(15)

<223> n is a, c, g, or t

<400> 7

ctngngngayc grgtngc

17

<210> 8

<211> 17

<212> DNA

<213> Artificial

<220>

<223> Primer AM835n-s2c

<220>

<221> misc_feature

<222> (3)..(3)

<223> n is a, c, g, or t

<220>

<221> misc_feature

<222> (6)..(6)

<223> n is a, c, g, or t

10583-WO.ST25

<220>
<221> misc_feature
<222> (15)..(15)
<223> n is a, c, g, or t

<400> 8
ctnggngayc gygtngc 17

<210> 9
<211> 18
<212> DNA
<213> Artificial

<220>
<223> amy835as1

<400> 9
gcggatagta gatgggat 18

<210> 10
<211> 17
<212> DNA
<213> Artificial

<220>
<223> Primer amy835f2

<400> 10
gtgcgtcctt caccgat 17

<210> 11
<211> 17
<212> DNA
<213> Artificial

<220>
<223> amy835s00

<400> 11
tcccgtcatc ctctctt 17

<210> 12
<211> 18
<212> DNA
<213> Artificial

<220>
<223> amy835as01

<400> 12
tctcaccgac acaacgaa 18

<210> 13
<211> 20
<212> PRT
<213> Chaetomium sp.

<220>
<221> misc_feature
<222> (9)..(9)
<223> Xaa can be any naturally occurring amino acid

10583-WO.ST25

<400> 13

Ala Ser Asn Ser Asp Trp Arg Ser Xaa Asn Lys Tyr Phe Ala Leu Gly
 1 5 10 15

Asp Arg Val Ala
 20

<210> 14
 <211> 17
 <212> DNA
 <213> Artificial

<220>
 <223> amy835as3

<400> 14
 gtagtcaatg tcgcact 17

<210> 15
 <211> 18
 <212> DNA
 <213> Artificial

<220>
 <223> amy835f1

<400> 15
 ccatctacta tccgctca 18

<210> 16
 <211> 28
 <212> DNA
 <213> Artificial

<220>
 <223> Primer AM835.1

<400> 16
 ccaggatccg tcaggatgcg atccttcc 28

<210> 17
 <211> 29
 <212> DNA
 <213> Artificial

<220>
 <223> Primer AM835.2

<400> 17
 cgtctcgagg acacaacgaa aaagcatca 29

<210> 18
 <211> 1898
 <212> DNA
 <213> Valsaria rubricosa

<220>
 <221> CDS
 <222> (16)..(1773)

4

[illegible]

10583-WO.ST25																
205								210				215				
gac Asp	acc Thr	tcc Ser	tac Tyr 220	gtg Val	gcc Ala	ggc Gly	tat Tyr	caa Gln 225	tcg Ser	gtg Val	atg Met	ccg Pro	ggc Gly 230	ctg Leu	ctc Leu	771
aac Asn	tac Tyr	ccc Pro 235	atc Ile	tac Tyr	tat Tyr	ccg Pro	ctc Leu 240	atc Ile	cgc Arg	gtc Val	ttc Phe	gcg Ala 245	cag Gln	ggg Gly	gcg Ala	819
tcc Ser	ttc Phe 250	acc Thr	gac Asp	ctc Leu	gtc Val	agc Ser 255	aac Asn	cac His	gat Asp	tcc Ser	gtc Val 260	ggc Gly	tcg Ser	acc Thr	ttc Phe	867
tcc Ser 265	gac Asp	ccg Pro	acg Thr	ctg Leu	ctg Leu 270	ggc Gly	aac Asn	ttc Phe	atc Ile	gac Asp 275	aac Asn	cac His	gac Asp	aat Asn	cca Pro 280	915
cgt Arg	ttc Phe	ctg Leu	agc Ser	tac Tyr 285	acc Thr	agc Ser	gac Asp	cac His	gcc Ala 290	ctc Leu	ctc Leu	aag Lys	aac Asn	gct Ala 295	ctg Leu	963
gcc Ala	tac Tyr	gtg Val	atc Ile 300	ctg Leu	gcc Ala	aga Arg	ggc Gly	atc Ile 305	ccc Pro	atc Ile	gtc Val	tac Tyr	tac Tyr 310	ggc Gly	acc Thr	1011
gag Glu	caa Gln	ggc Gly 315	tac Tyr	tcg Ser	ggg Gly	tcg Ser	tcg Ser 320	gac Asp	ccg Pro	gcg Ala	aac Asn	cgc Arg 325	gag Glu	gat Asp	ctc Leu	1059
tgg Trp	cgt Arg 330	agc Ser	gga Gly	tac Tyr	agc Ser	acc Thr 335	acg Thr	ggg Gly	gac Asp	atc Ile	tac Tyr 340	acc Thr	acc Thr	atc Ile	gcc Ala	1107
gcc Ala 345	ctc Leu	tcc Ser	gcc Ala	gcg Ala	cgc Arg 350	acc Thr	gcg Ala	gcc Ala	ggg Gly	ggc Gly 355	ctc Leu	gcc Ala	ggg Gly	aac Asn	gat Asp 360	1155
cac His	gtt Val	cac His	ctg Leu	tac Tyr 365	aca Thr	acc Thr	gac Asp	aac Asn	gcg Ala 370	tac Tyr	gcc Ala	tgg Trp	tcc Ser	cgt Arg 375	gcg Ala	1203
agc Ser	ggc Gly	aag Lys	ctc Leu 380	atc Ile	gtc Val	gtc Val	acg Thr	tcc Ser 385	aac Asn	cgc Arg	ggc Gly	agc Ser	tcc Ser 390	gac Asp	agc Ser	1251
agc Ser	acc Thr	atc Ile 395	tgc Cys	ttc Phe	agc Ser	acc Thr	cag Gln 400	cag Gln	gcc Ala	agc Ser	ggc Gly	acc Thr 405	acc Thr	tgg Trp	acc Thr	1299
agc Ser	acg Thr 410	atc Ile	acc Thr	ggc Gly	aac Asn	tcg Ser 415	tac Tyr	acc Thr	gcc Ala	gac Asp	agc Ser 420	aac Asn	ggc Gly	cag Gln	atc Ile	1347
tgc Cys 425	gtg Val	cag Gln	ctg Leu	tcc Ser	agc Ser 430	ggc Gly	ggg Gly	ccc Pro	gag Glu	gcg Ala 435	ctc Leu	gtc Val	gtc Val	tcc Ser	acc Thr 440	1395
gcg Ala	acc Thr	ggc Gly	acg Thr	gcc Ala 445	acg Thr	gcg Ala	acg Thr	acc Thr	ctg Leu 450	tcc Ser	acg Thr	acc Thr	acc Thr	aag Lys 455	acg Thr	1443
tcc Ser	acc Thr	tcg Ser	acc Thr 460	gcc Ala	tcc Ser	tgc Cys	gcc Ala	gcc Ala 465	acc Thr	gtc Val	gcc Ala	gtc Val	acc Thr 470	ttc Phe	aat Asn	1491
gag Glu	ctc Leu	gtc Val	acc Thr	acc Thr	aac Asn	tac Tyr	ggc Gly	gac Asp	acc Thr	atc Ile	cgc Arg	ctg Leu	acg Thr	ggc Gly	tcc Ser	1539

10583-WO.ST25

475	480	485	
atc tcc cag ctc agc agc tgg agc gca acc tcc ggg ctg gcc ctg agc Ile Ser Gln Leu Ser Ser Trp Ser Ala Thr Ser Gly Leu Ala Leu Ser 490 495 500			1587
gcg tcc gcg tac acg tcc agc aac ccg ctc tgg agc gtg acg gtc agc Ala Ser Ala Tyr Thr Ser Ser Asn Pro Leu Trp Ser Val Thr Val Ser 505 510 515 520			1635
ctg cct gcc gcc acg tcg ttc gag tac aag ttc gtc cgc atc acg agc Leu Pro Ala Gly Thr Ser Phe Glu Tyr Lys Phe Val Arg Ile Thr Ser 525 530 535			1683
gac gcc acc gtc acc tgg gaa tcg gac ccg aac cgc agc tac acc gtc Asp Gly Thr Val Thr Trp Glu Ser Asp Pro Asn Arg Ser Tyr Thr Val 540 545 550			1731
ccg acg tgc gcg agc acc gca acg atc agc aat acc tgg cg Pro Thr Cys Ala Ser Thr Ala Thr Ile Ser Asn Thr Trp Arg 555 560 565			1773
tgagctgtgg atgtatctgt atctgtacat atgagaggtc tttgagaggc cagggcggtt			1833
ggtggctcggg gtgaatgggg ggttgatccg ttttcgttgt gtcggtgaga ttggttacga			1893
tggtg			1898
<210> 19			
<211> 586			
<212> PRT			
<213> Valsaria rubricosa			
<400> 19			
Met Arg Ser Phe Leu Ala Leu Ser Ala Leu Leu Leu Tyr Pro Leu -20 -15 -10 -5			
Gln Leu Leu Ala Ala Ser Asn Ser Asp Trp Arg Ser Arg Asn Ile Tyr -1 1 5 10			
Phe Ala Leu Thr Asp Arg Val Ala Asn Pro Ser Thr Thr Thr Ala Cys 15 20 25			
Ser Asp Leu Ser Asn Tyr Cys Gly Gly Thr Trp Ser Gly Leu Ser Ser 30 35 40			
Lys Leu Asp Tyr Ile Gln Gly Met Gly Phe Asp Ser Ile Trp Ile Thr 45 50 55 60			
Pro Val Val Glu Asn Cys Asp Gly Gly Tyr His Gly Tyr Trp Ala Lys 65 70 75			
Ala Leu Tyr Asn Val Asn Thr Asn Tyr Gly Ser Ala Asp Asp Leu Lys 80 85 90			
Asn Phe Val Ala Ala Ala His Ala Lys Gly Met Tyr Val Met Val Asp 95 100 105			

10583-WO.ST25

Val Val Ala Asn His Met Gly Ser Cys Gly Ile Ala Asn Leu Ser Pro
110 115 120

Pro Pro Leu Asn Glu Glu Ser Ser Tyr His Thr Gln Cys Asp Ile Asp
125 130 135 140

Tyr Ser Ser Gln Ser Ser Ile Glu Thr Cys Trp Ile Ser Gly Leu Pro
145 150 155

Asp Leu Asp Thr Thr Asp Ser Thr Ile Arg Ser Leu Phe Gln Thr Trp
160 165 170

Val His Gly Leu Val Ser Asn Tyr Ser Phe Asp Gly Leu Arg Val Asp
175 180 185

Thr Val Lys His Val Glu Lys Asp Tyr Trp Pro Gly Phe Val Ser Ala
190 195 200

Ala Gly Thr Tyr Ala Ile Gly Glu Val Phe Ser Gly Asp Thr Ser Tyr
205 210 215 220

Val Ala Gly Tyr Gln Ser Val Met Pro Gly Leu Leu Asn Tyr Pro Ile
225 230 235

Tyr Tyr Pro Leu Ile Arg Val Phe Ala Gln Gly Ala Ser Phe Thr Asp
240 245 250

Leu Val Ser Asn His Asp Ser Val Gly Ser Thr Phe Ser Asp Pro Thr
255 260 265

Leu Leu Gly Asn Phe Ile Asp Asn His Asp Asn Pro Arg Phe Leu Ser
270 275 280

Tyr Thr Ser Asp His Ala Leu Leu Lys Asn Ala Leu Ala Tyr Val Ile
285 290 295 300

Leu Ala Arg Gly Ile Pro Ile Val Tyr Tyr Gly Thr Glu Gln Gly Tyr
305 310 315

Ser Gly Ser Ser Asp Pro Ala Asn Arg Glu Asp Leu Trp Arg Ser Gly
320 325 330

Tyr Ser Thr Thr Gly Asp Ile Tyr Thr Thr Ile Ala Ala Leu Ser Ala
335 340 345

Ala Arg Thr Ala Ala Gly Gly Leu Ala Gly Asn Asp His Val His Leu
350 355 360

Tyr Thr Thr Asp Asn Ala Tyr Ala Trp Ser Arg Ala Ser Gly Lys Leu
365 370 375 380

Page 14